ETS-4 CHANNEL UNIT, 628255

GENERAL DESCRIPTION

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1. GENERAL

1.01 This Section provides a general description of the ITT D448 ETS-4 channel unit, 628255 (Fig. 1), to the functional block diagram level.

1.02 Whenever this Section is reissued, the reasons for reissue will be listed in this paragraph.

1.03 The ETS-4 unit provides the voice frequency (VF) and signaling interface between a North Electric ETS-4 toll-switching system and the D448 multiplex terminal common equipment. In the transmit direction, the ETS-4 unit converts VF and transmit signaling information into pulse code modulation (PCM) for application to the common equipment. In the receive direction, the ETS-4 unit decodes received PCM into VF and signaling information. During system outages, the ETS-4 unit provides a disconnect/make-busy routine for the trunk. The ETS-4 unit provides a 600-ohm, 4-wire, 2-way message circuit.

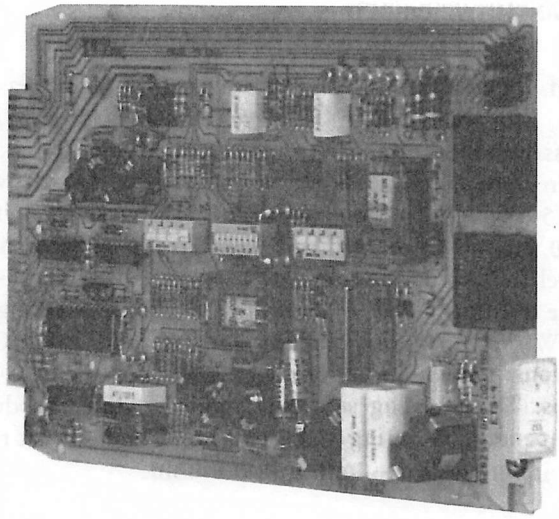


Fig. 1—ETS-4 Channel Unit, 628255

2. DESCRIPTION

2.01 The unit mounts in the D448 multiplex shelf (channel unit mounting section) in connectors J1A through J24A (for Digroup A) or connectors J1B through J24B (for Digroup B). Installation procedures for the unit are provided in Section ITTR-18-441.

2.02 The unit is available in Group -0 only.

2.03 The unit consists of an epoxy-glass printed circuit board (PCB) and associated circuit components. The lower front edge of the PCB is fitted with a handle to facilitate insertion and removal of the unit from the shelf. An identification strip on the handle face indicates the unit mnemonic (ETS-4), last three digits of the model number, last three digits of the part number, and issue letter. The part number and issue letter are also located on the component side of the PCB.

2.04 RT and SMR LEDs (DS1 and DS2, respectively) and splitting card jacks (J1 and J2) are located on the front edge of the PCB.

2.05 Printed circuit wiring is etched on both sides of the PCB. The units inputs and outputs are terminated

in gold-plated contacts on the rear edge of the PCB. These contacts mate with a 60-pin contact edge connector on the rear of the multiplex shelf.

3. FUNCTIONAL OPERATION (FIG. 2)

TRANSMIT VF CIRCUIT

3.01 The incoming VF is transformer-coupled, via part of the transmit (TX) level DIP switch, to the low-pass/high-pass filter where it is amplified and filtered. The gain applied to the input signal can be varied over a 16.5-dB range to compensate for VF input levels from +0.5 to −14.5 dBm (in 1-dB steps) by the selection of TX level DIP switch options [+1], [+2], [+4], and [+8]. The resulting signal is passed to the TX office wiring loss (OWL) compensation circuit. The TX prescription OWL options provide an additional 1.5 dB of gain in 0.1-dB steps. The resulting signal is applied to the encoder to compensate for wiring/cabling losses. The resultant range for input levels is −16.0 to +0.5 dBm.

3.02 The encoder converts the VF signal information to an 8-bit PCM word. When the TX AND gate is activated by the transmit logic unit (TLU) on the TCS4-X and TCS6-X leads, the 8-bit word is applied to the TLU via the TCD bus. The data is clocked out of the unit under control of the 1.536-MHz clock from the TLU.

RECEIVE VF CIRCUIT

3.03 An 8-bit PCM word from the receive logic unit (RLU) is applied to the decoder on the RCD bus. The decoder will only accept the data when the receive (RX) AND gate is activated by the RLU on the RCS4-X and RCS6-X leads. The decoder converts the PCM word into VF signal information.

3.04 The VF signal is applied to the low-pass filter and passed through to the RX OWL compensation circuit. The RX prescription OWL options provide 0 to 1.5 dB of gain in 0.1-dB steps to the signal out of the low-pass filter to compensate for office wiring/cabling losses. The output of this circuit is further amplified. This amplification can be varied over a 15-dB range (in 1-dB increments) by the selection of RX VF level DIP switch options [−1], [−2], [−4], and [−8]. This provides output levels of +7.0 to −9.5 dBm in 0.1-dB steps with both the OWL and VF level options. The amplified VF is transformer-coupled to the C.O. equipment.

TRANSMIT SIGNALING

3.05 An idle condition is represented by an open from the SMR lead to the SMG lead. This condition is applied, via the loop detector, to the TX signaling (SIG) interface circuit, which in turn applies this information to the encoder. However, the encoder will not process the information until it is signaled on the TA/B lead by the TLU that the signaling frame is upcoming.

3.06 A busy condition is represented by presenting a loop from the SMR lead to the SMG lead. This condition turns on the SMR LED and is applied to the TX SIG interface circuit and processed as described in Para. 3.05.

3.07 Dialing is presented by the C.O. equipment as an alternate loop open-closure from the SMG lead to the SMR lead. The dialing information is applied to the TX SIG interface circuit and processed as described in Para. 3.05.

RECEIVE SIGNALING

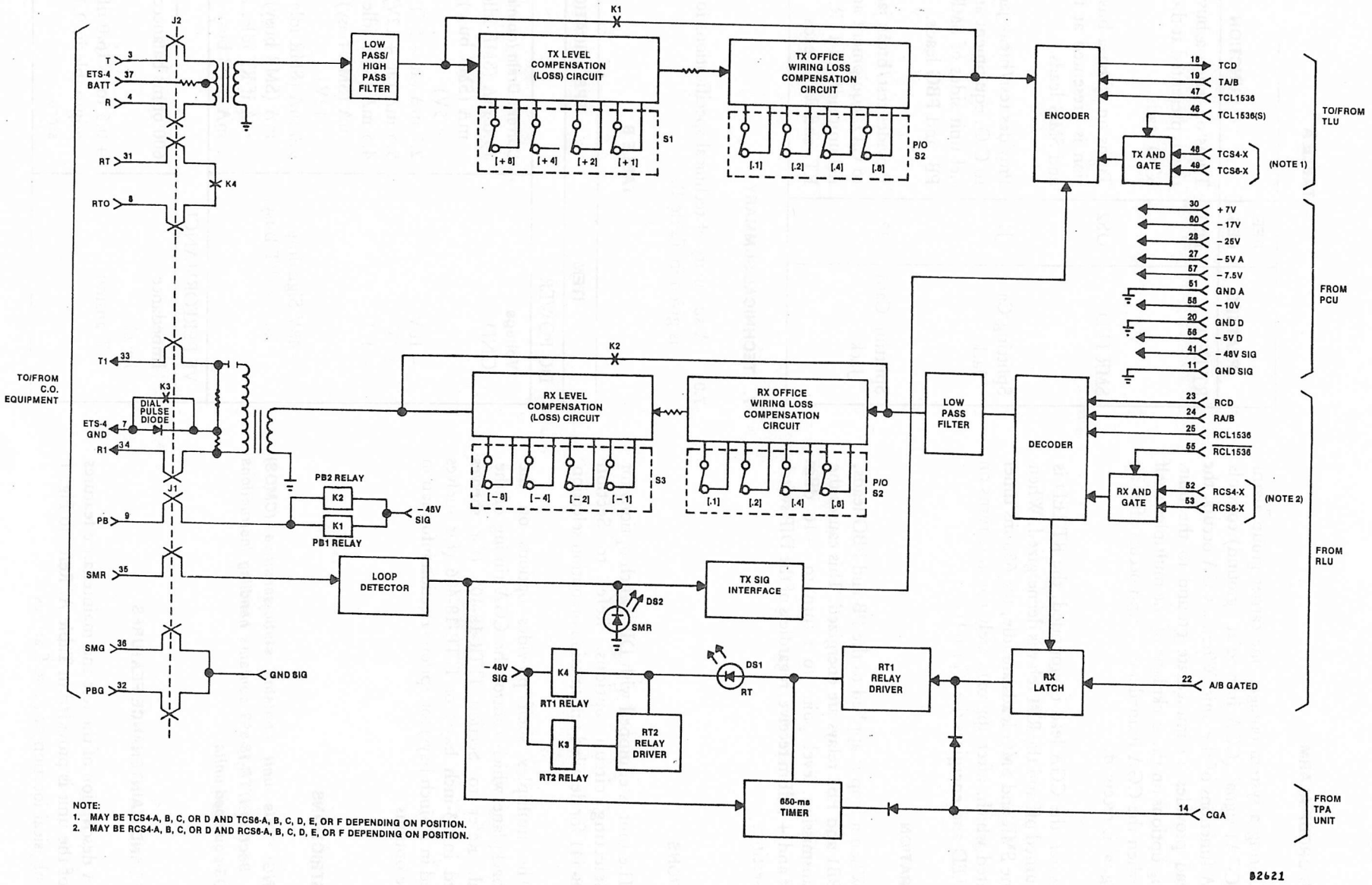
3.08 The decoder converts receive signaling information from the 8-bit PCM word when it is signaled by the RLU on the RA/B lead that the signaling frame is being processed by the terminal. The decoded signaling information is applied to the RX latch.

3.09 During an idle condition, the RT1 relay is deenergized, presenting an open circuit at the RT lead, and the RT LED is off. Also, the RT2 relay is energized.

3.10 During a busy condition, the RT1 relay is energized causing a closed loop from the RT lead to the RTO lead. Also, RT2 relay is deenergized, opening the contacts across the dial pulse test diode. Additionally, the RT LED is turned on during a busy condition.

3.11 Far-end dialing alternately energizes and deenergizes the RT1 relay at the dialing rate which alternately conditions the RT and RTO leads to reproduce the far-end dialing.

3.12 During intermittent terminal failures (momentary failures), the RX latch is inhibited from processing signaling information. This results in signaling state storage, which forces the unit to remain in its previous state (idle or busy) during the momentary failure to keep from dropping connections or to keep the unit from being accessed. The signaling state storage is controlled by the RLU. During a momentary failure, the RLU forces the A/B GATED lead low which inhibits the RX latch.



NOTE:
1. MAY BE TCS4-A, B, C, OR D AND TCS6-A, B, C, D, E, OR F DEPENDING ON POSITION.
2. MAY BE RCS4-A, B, C, OR D AND RCS6-A, B, C, D, E, OR F DEPENDING ON POSITION.

Fig. 2—ETS-4 Channel Unit, 628255, Functional Block Diagram

CARRIER GROUP ALARM

3.13 During a system outage, one carrier group alarm (CGA) signal (CGA immediate ground) controls the CGA functions of the unit. When a CGA occurs, the CGA lead provides an immediate ground to the unit. Strapping options on the backplane of the multiplex shelf control when the CGA immediate ground occurs after an alarm signal is received.

3.14 When the CGA lead is grounded, the RT LED is turned off and the RT1 relay is deenergized. When (or if) the SMR and SMG leads are idle, the 650-ms timer is activated which, after approximately 650 ms, turns on the RT LED and energizes the RT1 relay.

PB OPERATION

3.15 When a loop is applied to the PB and PBG leads, PB1 and PB2 relays are energized. This causes the unit transmission level point to return to −16 dBm transmit and +7 dBm receive, regardless of the DIP switch option setting.

4. OPTIONS

4.01 The unit is equipped with DIP switch options for selecting circuit options. Refer to Section ITTR-18-441 for detailed information on option selection.

4.02 The multiplex shelf provides options on the backplane which control the CGA timing of the terminal. Refer to Section ITTR-18-405 (for shelves mounted in 23-inch bays) or ITTR-18-406 (for shelves mounted in 19-inch bays) for option selection information on these options.

5. RESTRICTIONS

WARNING: This unit contains static-sensitive (CMOS) devices. Section ITTR-18-599 contains handling instructions for CMOS-equipped units.

6. TEST AND MAINTENANCE FEATURES

6.01 A description of the test and maintenance features of the unit is provided in Table A. Refer to Fig. 1 for the physical location of these features.

TABLE A

FEATURE	REF. DES.	FUNCTION
RT LED	DS1	Turns on when a busy condition is presented at the RT and RTO leads.
SMR LED	DS2	Turns on when a busy condition is presented at the SMR and SMG leads.
Splitting Card Jack	J1	Provides test/break jack access to C.O. equipment and channel unit sides of SMR, SMG, PB, and PBG leads.
Splitting Card Jack	J2	Provides test/break jack access to C.O. equipment and channel unit sides of T, R, T1, R1, RT, and RTO leads.

7. TECHNICAL SUMMARY

7.01 A summary of technical specifications for the unit is given in Table B.

TABLE B

ITEM	SPECIFICATION
DC POWER	
Voltage	**Current Drain (nominal)**
GND	19.0 mA (SMR idle), 27.5 mA (SMR busy) (at +5V)
−10V	2.0 mA (at −5V)
+7V	5.5 mA (at +12V)
−17V	4.5 mA (SMR idle), 13.5 mA (SMR busy) (at −12V)
−48V Signaling Battery (RT Busy)	9.0 mA (SMR idle), 11.5 mA (SMR busy); add 1 mA if RT idle, add 23.0 mA if PB busy
VF PERFORMANCE	
Impedance	600 ohms balanced
Levels	
Transmit	+0.5 to −16.0 dBm, adjustable in 0.1-dB steps

TABLE B (CONT)

ITEM	SPECIFICATION
Receive	+7.0 to −9.5 dBm, adjustable in 0.1-dB steps
Loss Stability (End-to-End)	±0.5 dB over life in 95% of the circuits
Tracking (End-to-End)	
−37 to +3 dBm0 Input	0.5 dB maximum deviation
−50 to −37 dBm0 Input	1.0 dB maximum deviation
Idle Channel Noise (End-to-End)	23 dBrnc0 maximum
Signal-to-Distortion	
0 to −30 dBm0 Input	33 dB minimum overall; 35 dB minimum receive or transmit
−40 dBm0 Input	27 dB minimum overall; 29 dB minimum receive or transmit
−45 dBm0 Input	22 dB minimum overall; 25 dB minimum receive or transmit
Single Frequency Distortion (at 0 dBm0)	
Input Swept from 0 to 12 kHz	−28 dBm0 maximum at any other frequency
Input between 1004 and 1020 Hz	−40 dBm0 or less at any other frequency of 0 to 4 kHz with a distortion contribution objective from either transmit or receive of typically 6 dB better
Return Loss	
1000 Hz	28 dB minimum
300 to 3000 Hz	23 dB minimum
Frequency Response (Referenced 1020 Hz End-to-End)	
200 Hz	0, −3.0 dB
300 to 3000 Hz	±0.3 dB
3200 Hz	+0.15, −1.5 dB
3400 Hz	0, −3.0 dB

TABLE B (CONT)

ITEM	SPECIFICATION
Longitudinal Balance (AT&T or IEEE Method)	
At each port	
200 Hz	86 dB minimum
1000 Hz	80 dB minimum
3000 Hz	78 dB minimum
SIGNALING	
Pulsing (Single Ended)	
Speed	8 to 12 pps
Duty Cycle	30 to 90% break
Distortion	±1 ms
SMR/SMG Threshold	
Off-Hook	1 K ohm between SMR and SMG
On-Hook	10 K ohm between SMR and SMG
OPERATING ENVIRONMENT	
Temperature	0 to +55°C
Humidity	To 95% at 40°C (no condensation)
Altitude	To 14,000 ft (4,300 m)
DIMENSIONS	
Width	0.8 in. (1.9 cm)
Height	5.9 in. (15.0 cm)
Depth	9.7 in. (24.6 cm)
WEIGHT	0.5 lb (0.2 kg)

8. REPLACEABLE PARTS

8.01 This unit has no field-replaceable parts.

9. REFERENCES

9.01 The engineering drawings noted in Table C were used in the preparation of this Section.

TABLE C

TYPE	DRAWING NO.
Assembly	628255-000
Schematic	628255-002

9.02 Related information on the units may be found in the ITTR Sections referenced in Table D.

TABLE D

TITLE	SECTION NO.
Connectorized Multiplex Shelf (MS/WC7, MS/WC5, MS/C7 and MS/C6), 628001, 628005, 628011 and 628015 (For 23-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-405
Connectorized Multiplex Shelf (MS19/WC7, MS19/WC5, MS19/C7 and MS19/C6), 628003, 628008, 628013 and 628018 (For 19-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-406
Special Service Channel Units — Option Selection and Installation	ITTR-18-441